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LISTS OF SPECIES

Amphibia, Anura, Coastal Zone, state of Piauí, Northeastern Brazil.

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Abstract: Amphibians are an important component of terrestrial and aquatic freshwater communities worldwide. Especially to the Northern coastal zone of Brazil, the knowledge about amphibian communities is very scarce. We have studied amphibian assemblages along the coastal strip zone of the state of Piauí for two years, covering a distance of ca. 70 km. It was possible to prepare a list of 21 anurans from 6 families (Microhylidae, Hylidae, Leptodactylidae, Cycloramphidae, Leiuperidae, and Bufonidae). All species are common and widely distributed in Brazilian territory, mainly on the Caatinga biome. The results are important to amplify the knowledge on the biodiversity found at the coastal zone of the state of Piauí.

Introduction

Although there are studies reporting on the fauna of amphibians in the environments along the Brazilian coastal zone (e.g. Schineider and Teixeira 2001; Cascon and Borges-Nojosa 2003; Loebmann 2005; Loebmann and Vieira 2005; Juncá 2006), the knowledge of the amphibians communities along the littoral is still very deficient, considering that the coastal zone of Brazil has ca. 8,500 kilometers of extension (Awosika and Marone 2000).

Similar situation can be found in the state of Piauí, where studies on the anuran fauna are limited to the description of two species (Caramaschi and Jim 1983a; b), an expansion of the geographical distribution of one species to the *Parque Nacional Sete Cidades* (Sete Cidades National Park; Annunziata et al. 2007), and a species list for the coastal dunes from the municipality of Ilha Grande (Silva et al. in press).

The entire coastal zone of the state lies within the *Área de Proteção Ambiental (APA) do Delta do Parnaíba* (Environmental Protection Area of the Parnaíba River Delta). Even so, human activities like constructions (e.g. houses, roads, tourist accommodations, and shrimp farms), deforestation, and pollution have often caused loss or damage of natural habitats occupied by amphibians and other taxa. This is a worldwide problem that has already caused the decline of some species (Brooks et al. 2002), especially in coastal zones, where human population is concentrated and increasing quickly. In this context, biological inventories are very important to provide support for actions of coastal management. In order to contribute to the knowledge of the amphibian fauna, a list of species that occur along the coastal zone of the state of Piauí is presented.

Material and Methods

We sampled seven sites of the coastal zone of the state of Piauí, located in the municipalities of Parnaíba, Luís Correia, and Cajueiro da Praia, between the coordinates 02°09' S, 41°15' W and 02°45' S, 41°51' W (Figure 1). The regional climate presents warm temperatures during all the year (from 22 to 33 ºC), and is characterized by a marked dry period with precipitation below 100 mm between June and December, and a rainy period in the first months of the year (Figure 2). The coastal zone is basically characterized by the presence of coastal dunes and mangrove forests, which are limited in the south by a physiognomy known as secondary stationary vegetation of *Cerradão* (CEPRO 1996). Although Ab'Sáber (1977) classified this area as a transitional zone between the biomes of Caatinga and Cerrado, the composition of its herpetofauna is clearly related to the Caatinga, as showed below.

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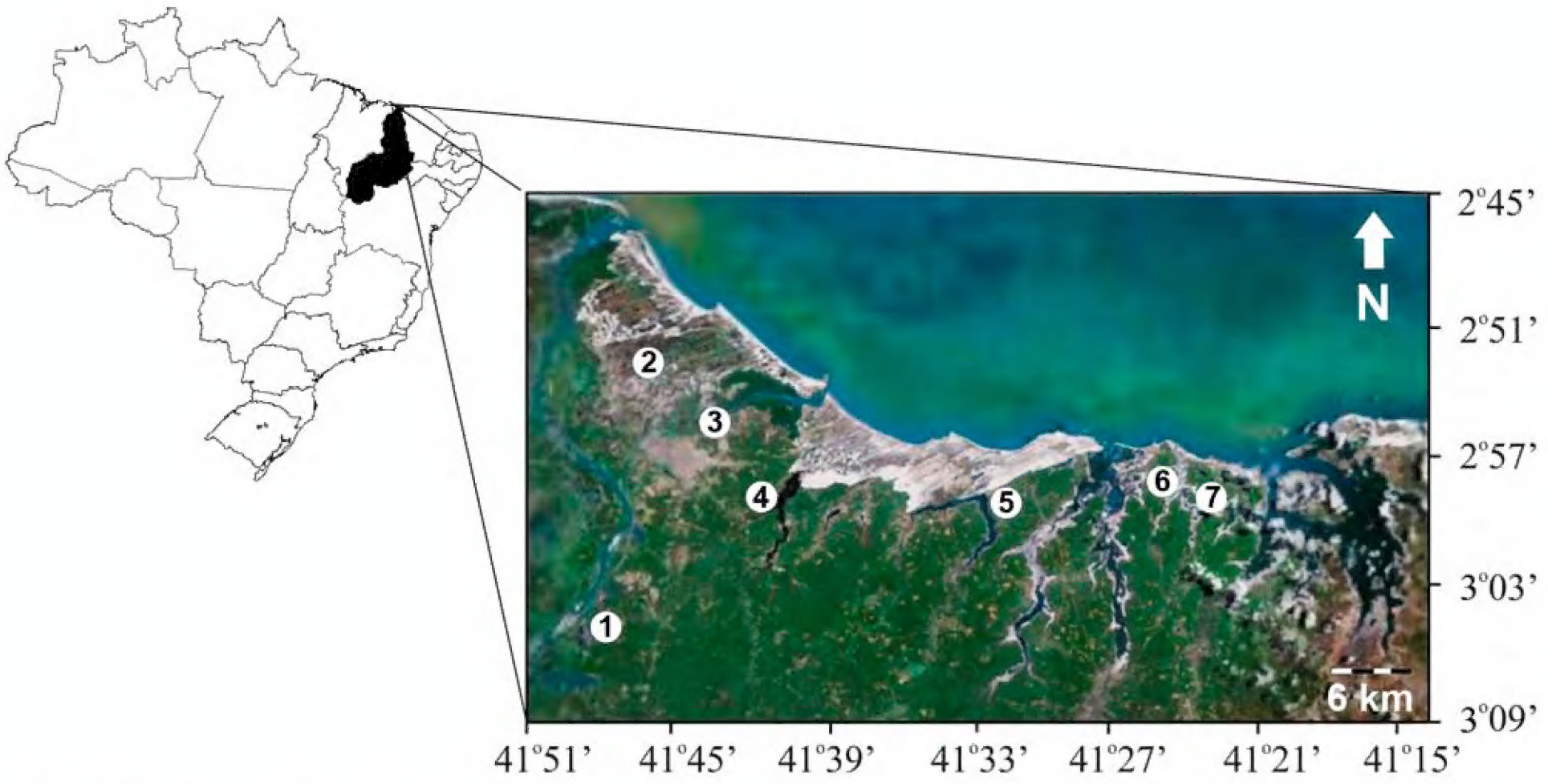

Figure 1. Study area. Satellite image of the coastal zone of the state of Piauí, Brazil, showing the sites investigated.

Samplings were conducted between 2005 and 2007, as follows: bimonthly samplings from January to December 2005 in the surroundings of the town of Parnaíba (Site 3, Figure 1); bimonthly samplings from June 2006 to July 2007 in the municipality of Cajueiro da Praia (Sites 6 and 7, Figure 1), and non-regular, intensified collections during the months with higher precipitation (February to May) in all sites. We investigated permanent and temporary ponds in mangrove, coastal dunes, and *Cerradão* borders using active search and vocalization activity monitoring. Taxonomy and species group allocation follows Faivovich et al. (2005), Frost et al. (2006), and Chaparro et al. (2007). Voucher specimens were deposited in the Herpetological Collection of the *Universidade Federal da Paraíba* (UFPB) and in the Célio F. B. Haddad Amphibian Collection (CFBH), *Universidade Estadual Paulista* (UNESP), Rio Claro, São Paulo.

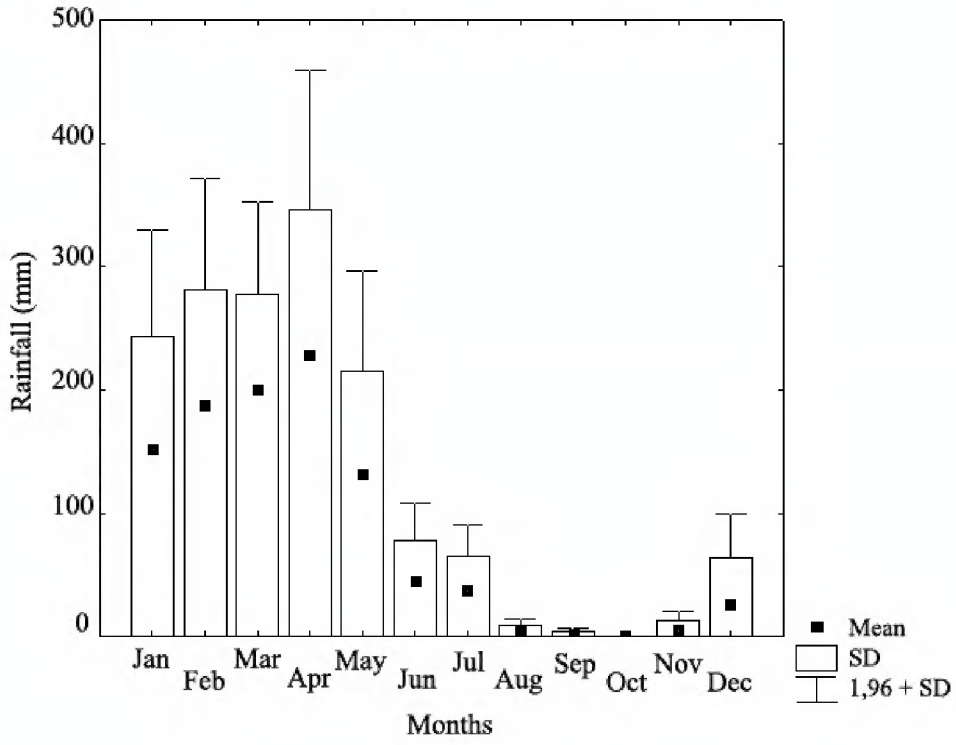

Figure 2. Mean, standard deviation (SD), and 95 % confidence interval (1.96+SD) of rainfall data (period 1990 to 2005). Font: Meteorological station of the *Embrapa Meio-Norte*, Parnaíba, Piauí, Brazil.

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At least one individual of each species was photographed. Images were made by the first author with a *Canon PowerShot A620* digital camera (7.0 megapixels and 180 dpi of image resolution) and a *Sony DSC-F828* digital camera (8.0 megapixels and 72 dpi of image resolution).

Results and Discussion

A total of 21 species (Figures 3-6) from six anuran families was found on the coastal zone of the state of Piauí (Table 1). Hylidae presented nine species and was the richest family, followed by Leptodactylidae and Leiuperidae, both with four species. Although *Dendropsophus soaresi* and *Dermatonotus muelleri* were not collected during our field samplings, it is likely that they also occur in the coastal zone of Piauí, since both species have already been observed in areas near the Caatinga on the southern region of the state.

The amphibian fauna of the coast of Piauí and neighbouring states is virtually unknown. Silva et al. (in press) recorded the presence of 14 species for the coastal dunes of the municipality of Ilha Grande, Piauí. Their study is very important in order to complement the present one, since our study included no samples in Ilha Grande. Silva et al. (in press) also report three species not recorded in the present study (*Elachistocleis ovalis*, *Leptodactylus ocellatus*, and *L. pustulatus*). However, we consider that the proper identifications for specimens referred to as *E. ovalis* and *L. ocellatus* in Silva et al. (in press) are *E. piauiensis* and *L. macrosternum*. Therefore, the anuran fauna of the coastal zone of Piauí is characterized by at least 22 species. For the neighboring state of Ceará, 20 species are known from the coastal areas (Cascon and Borges-Nojosa 2003). A comparison of the anuran fauna from the coastal zones of the two states shows a great similarity in species number and composition; only *Dendropsophus soaresi*, *Leptodactylus mystaceus*, and *Scinax fuscomarginatus* were not found in the coastal zone of Piauí.

The number of species found in our study is also similar to those found in areas of Caatinga in the states of Pernambuco, Ceará, and Paraíba. In these surveys, 18 species were registered for Serra das Almas, a particular protected area in the municipality of Crateús, Ceará (Borges-Nojosa and Cascon 2005), 19 species were registered in two particular protected areas (Maurício Dantas, municipality of Betânia, and Cantidiano Valgueiro, municipality of Floresta) in Pernambuco (Borges-Nojosa and Santos 2005), and 21 species in two areas from the Curimataú valley, Paraíba (Arzabe et al. 2005). At least 11 species (*Hypsiboas raniceps*, *L. fuscus*, *L. vastus*, *L. macrosternum*, *L. troglodytes*, *Phyllomedusa nordestina*, *Proceratophrys cristiceps*, *Pleurodema diplolister*, *Rhinella granulosa*, *R. jimi*, and *Scinax x-signatus*) are common for all study sites, evidencing a strong influence of the Caatinga biome in the composition of the anuran fauna of the coastal zone of Piauí.

All species found are typical of open areas and show wide distribution (see Table 1). Some species such as *Dendropsophus minutus*, *L. fuscus*, *Physalaemus cuvieri*, and *Trachycephalus venulosus*, present ambiguous taxonomic status, and are probably species complexes (Wynn and Heyer 2001; Eterovick and Sazima 2004; Hawkins et al 2007). Others can possibly converge to new species, like *Dendropsophus* gr. *microcephalus* and *Pseudopaludicola* gr. *falcipes*. Thus, the distributional data shown in Table 1 may alter for small areas, as it has recently occurred for *Phyllomedusa nordestina*, previously recognized as *P. hypochondrialis* (Caramaschi 2006), and for *Leptodactylus vastus*, previously recognized as *L. labyrinthicus* and now revalidated (Heyer 2005).

Regarding to the distribution of the species among the studied habitats, two patterns were observed (Table 1). Some species are widely distributed and commonly found in coastal and *Cerradão* areas. Other species are restricted to temporary pools in flooded *Cerradão* areas near the coast. These results are important to enhance the knowledge on the fauna in the *APA do Delta do Parnaíba* and to improve the comprehension of the distribution patterns of amphibian species in Caatinga areas.

Table 1. Species collected and their respective habitats in the coastal zone of the state of Piauí, along with the Brazilian biomes where they are known to occur. Habitat: M, Mangrove; D, Coastal dunes; C, Secondary stationary vegetation of *Cerradão*. Biomes: AM, Amazon Rain Forest biome; CA, Caatinga biome; CE, Cerrado biome; AT, Atlantic Rain Forest biome; PA, Pantanal biome; ES, Extreme South biome. N/A, No information available.

Taxon	Voucher number	Local status	Habitat	Biome	Reference used
Microhylidae					
Elachistocleis piauiensis	UFPB 4521	Common	D, C	CA, CE	Barreto (2007); Santos et al. (2005)
Hylidae					
Dendropsophus aff. *nanus*	UFPB 4520	Very common	C	AM, CA, CE, PA, AT	Frost (2007)
Dendropsophus gr. *microcephalus*	UFPB 4518	Common	C	N/A	N/A
Dendropsophus minutus	UFPB 4519	Occasional	C	All biomes	Frost (2007)
Hypsiboas raniceps	UFPB 4522	Very common	C	AM, CA, CE, PA, AT	IUCN (2007)
Phyllomedusa nordestina	UFPB 4525	Very common	D, C	CA	Caramaschi (2006)
Scinax gr. *ruber*	UFPB 4531	Very common	D, C	N/A	N/A
Scinax nebulosus	UFPB 4533	Common	C	AM, CA, CE, AT	Frost (2007)
Scinax x-signatus	UFPB 4532	Very common	D, C	AM, CA, CE, PA, AT	Frost (2007)
Trachycephalus venulosus	UFPB 4530	Occasional	C	AM, CA, CE, PA, AT	IUCN (2007)
Leptodactylidae					
Leptodactylus fuscus	CFBH 16122	Very common	M, D, C	All biomes	IUCN (2007)
Leptodactylus macrosternum	UFPB 4523	Very common	M, D, C	AM, CA, AT	Frost (2007)
Leptodactylus troglodytes	UFPB 4535	Common	C	CA, CE, AT	Arzabe and Almeida (1997); Silveira (2006)
Leptodactylus vastus	UFPB 4524	Common	M, D, C	CA	Heyer (2005)
Cycloramphidae					
Proceratophrys cristiceps	UFPB 4529		D, C	CA	Frost (2007)
Leiuperidae		Occasional			
Physalaemus albifrons	CFBH 18322	Very common	D, C	CA	Freitas and Silva (2007)
Physalaemus cuvieri	UFPB 4526	Common	C	All biomes	Frost (2007)
Pseudopaludicola gr. *falcipes*	UFPB 4534	Very common	M, D, C	N/A	N/A
Pleurodema diplolister	UFPB 4528	Very common	M, D, C	CA	Frost (2007)
Bufonidae					
Rhinella granulosa	UFPB 4516	Very common	D, C	CA, AT	Narvaes (unpublished data.)
Rhinella jimi	UFPB 4517	Very common	M, D, C	CA, AT	Stevaux (2002)

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Figure 3. Anuran species recorded on the coastal zone of the state of Piauí, Brazil, on samples made between 2005 and 2007. Family Microhylidae: A, *Elachistocleis piauiensis*. Family Hylidae: B, *Dendropsophus* aff. *nanus*; C, *Dendropsophus* gr. *microcephalus*; D, *Dendropsophus minutus*; E, *Hypsiboas raniceps*; F, *Phyllomedusa nordestina*.

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Figure 4. Anuran species recorded on the coastal zone of the state of Piauí, Brazil, on samples made between 2005 and 2007. Family Hylidae: A, *Scinax* gr. *ruber*; B, *Scinax nebulosus*; C, *Scinax x-signatus*; D, *Trachycephalus venulosus*. Family Leptodactylidae: E, *Leptodactylus fuscus*; F, *Leptodactylus macrosternum*.

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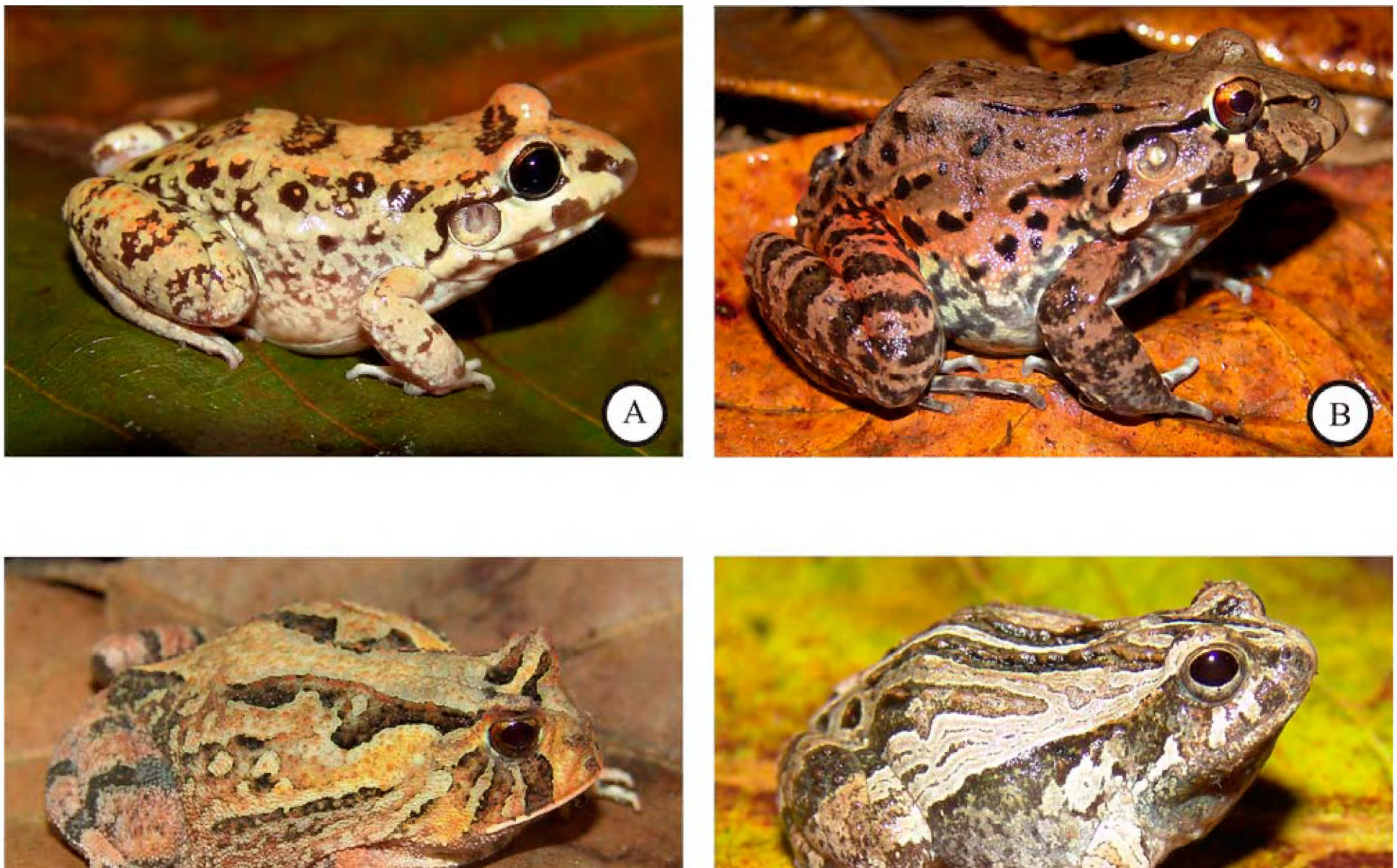

Figure 5. Anuran species recorded on the coastal zone of the state of Piauí, Brazil, on samples made between 2005 and 2007. Family Leptodactylidae: A, *Leptodactylus troglodytes*; B, *Leptodactylus vastus*. Family Cycloramphidae: C, *Proceratophrys cristiceps*. Family Leiuperidae: D, *Physalaemus albifrons*; E, *Physalaemus cuvieri*; F, *Pseudopaludicola* gr. *falcipes*.

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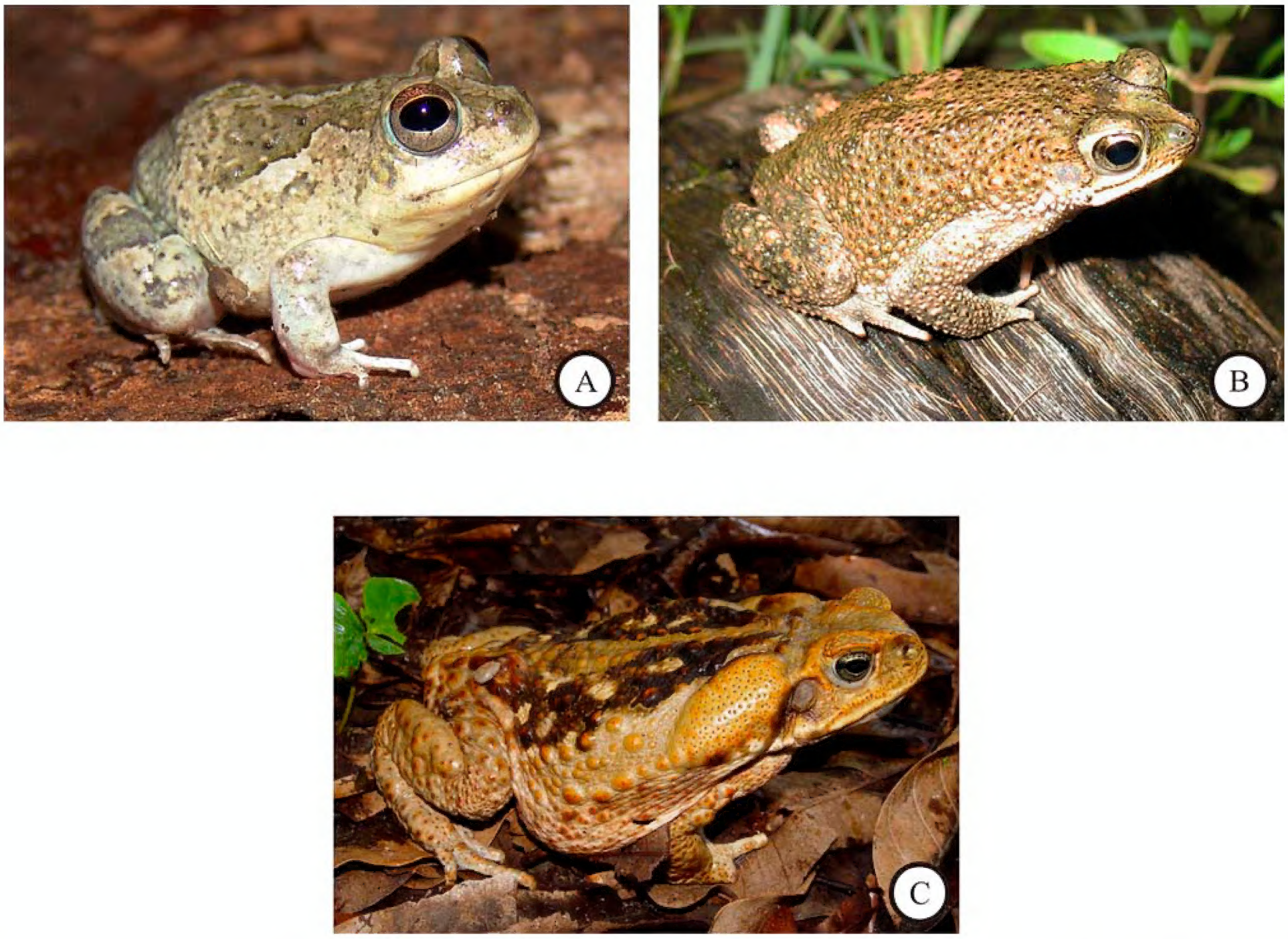

Figure 6. Anuran species recorded on the coastal zone of the state of Piauí, Brazil, on samples made between 2005 and 2007. Family Leiuperidae: A, *Pleurodema diplolister*. Family Bufonidae: B, *Rhinella granulosa*; C, *Rhinella jimi*.

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